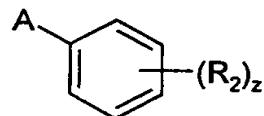


CLAIMS

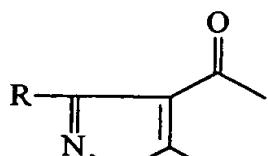
1. A method of reducing phytotoxicity to a crop (especially maize) at a locus caused by the application thereto of a herbicidal benzoylisoxazole and/or dione derivative of formula (I):



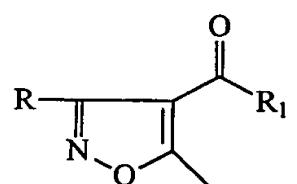
(I)

wherein:

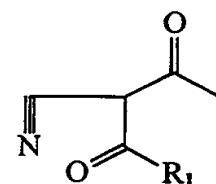
A is a group (A-1) to (A-7):



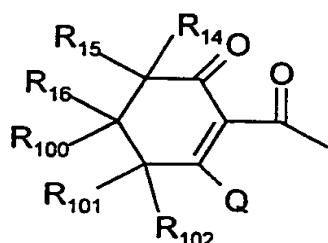
(A-1)



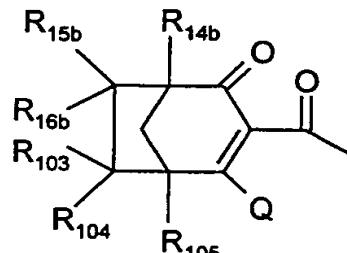
(A-2)



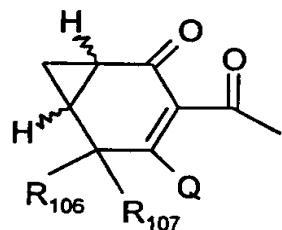
(A-3)



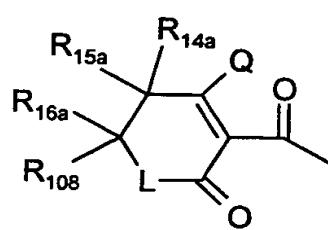
(A-4)



(A-5)



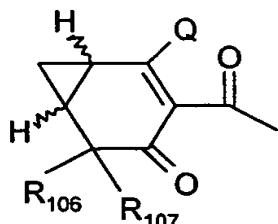
(A-6)



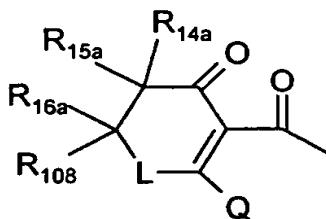
(A-7)

or a corresponding formula (A-6a) or (A-7a):

15



(A-6a)



(A-7a)

in which the position of the carbonyl group and the group Q are reversed and the double bond in the ring is attached to the carbon atom attached to the group Q;

5 R is a hydrogen atom or a halogen atom; a straight- or branched chain alkyl, alkenyl or alkynyl group containing from one to six carbon atoms which is optionally substituted by one or more halogen atoms; a cycloalkyl group containing from 3 to 6 carbon atoms optionally substituted by one or more groups R⁵, one or more halogen atoms or a group -CO₂R³; or a group selected from -CO₂R³, -COR⁵,

10 cyano, nitro, -CONR³R⁴ and -S(O)_kR¹³;

R¹ is a straight- or branched-chain alkyl, alkenyl or alkynyl group containing up to six carbon atoms which is optionally substituted by one or more halogen atoms; or a cycloalkyl group containing from three to six carbon atoms optionally substituted by one or more groups R⁵ or one or more halogen atoms;

15 R² is a halogen atom; a straight- or branched-chain alkyl, alkenyl or alkynyl group containing up to six carbon atoms which is optionally substituted by one or more halogen atoms; a straight- or branched-chain alkyl group containing up to six carbon atoms which is substituted by one or more groups -OR⁵; or a group selected from nitro, cyano, -CO₂R⁵, -S(O)_pR⁶, -O(CH₂)_mOR⁵, -COR⁵, -NR¹¹R¹², -N(R⁸)SO₂R⁷, -N(R⁸)CO₂R⁷, -OR⁵, -OSO₂R⁷, -SO₂NR³R⁴, -CONR³R⁴, -CSNR³R⁴, -(CR⁹R¹⁰)_y-S(O)_qR⁷ and -SF₅;

or two groups R², on adjacent carbon atoms of the phenyl ring may, together with the carbon atoms to which they are attached, form a 5 to 7 membered saturated or unsaturated heterocyclic ring containing up to three ring heteroatoms selected from nitrogen, oxygen and sulfur, which ring is optionally substituted by one or more groups selected from halogen, nitro, -S(O)_pR¹³, C₁₋₄ alkyl, C₁₋₄ alkoxy, C₁₋₄ haloalkyl, C₁₋₄ haloalkoxy, =O (or a 5- or 6- membered cyclic acetal thereof),

and $=\text{NO}-\text{R}^3$, it being understood that a sulphur atom, where present in the ring, may be in the form of a group $-\text{SO}-$ or $-\text{SO}_2-$;

z is an integer from one to five: when z is greater than one the groups R^2 may be the same or different;

5 R^3 , R^4 and R^{109} are each independently a hydrogen atom, or a straight- or branched chain alkyl group containing up to six carbon atoms which is optionally substituted by one or more halogen atoms;

R^5 and R^{110} are each independently a straight- or branched-chain alkyl group containing up to six carbon atoms which is optionally substituted by one or more

10 halogen atoms or a straight- or branched-chain alkenyl or alkynyl group containing from two to six (preferably from three to six) carbon atoms which is optionally substituted by one or more halogen atoms;

R^6 and R^7 , which may be the same or different, are each R^5 ; or phenyl optionally substituted by from one to five groups which may be the same or different

15 selected from a halogen atom, a straight- or branched-chain alkyl group containing up to six carbon atoms which is optionally substituted by one or more halogen atoms, nitro, cyano, $-\text{CO}_2\text{R}^5$, $-\text{S}(\text{O})_p\text{R}^{13}$, $-\text{NR}^{11}\text{NR}^{12}$, $-\text{OR}^5$ and $-\text{CONR}^3\text{R}^4$;

R^8 , R^9 and R^{10} are each a hydrogen atom or R^6 ;

R^{11} and R^{12} are each a hydrogen atom or R^5 ;

20 R^{13} and R^{111} are each a straight- or branched-chain alkyl group containing up to six carbon atoms which is optionally substituted by one or more halogen atoms;

Q is hydroxy, C1-6 alkoxy, OR^{112} , SR^{112} or SR^{111} ;

L is oxygen or NR^{109} ;

R^{14} , R^{14a} , R^{14b} , R^{15} , R^{15a} , R^{15b} , R^{16} , R^{16a} , R^{16b} , R^{100} , R^{101} , R^{102} , R^{103} ,

25 R^{104} , R^{105} , R^{106} , R^{107} and R^{108} are each the same or different groups selected from hydrogen, R^{110} , $-(\text{CH}_2)_u\text{CO}_2\text{R}^{109}$, halogen, cyano, C1-6 alkoxy, $-(\text{CH}_2)_x$ -[phenyl optionally substituted by from one to five groups R^{113} which may be the same or different], and cycloalkyl containing from three to six carbon atoms optionally substituted by C1-6 alkyl or $-\text{S}(\text{O})_p\text{R}^{111}$;

30 R^{112} is phenyl optionally substituted by from one to five groups selected from halogen, C1-6 alkyl, C1-6 haloalkyl, C1-6 alkoxy and nitro;

R¹¹³ is a group selected from halogen, R¹¹⁴, nitro, cyano, -CO₂R¹¹⁵, -S(O)_pR¹¹¹, -OR¹¹¹ and -NR¹¹⁵R¹¹⁶;

R¹¹⁴ is a straight- or branched- chain alkyl group containing one to three carbon atoms optionally substituted by one or more halogen atoms;

5 R¹¹⁵ and R¹¹⁶ which may be the same or different, are each a hydrogen atom or R¹¹⁰;

p, q and u are each independently zero, one or two;

k and m are each one, two or three;

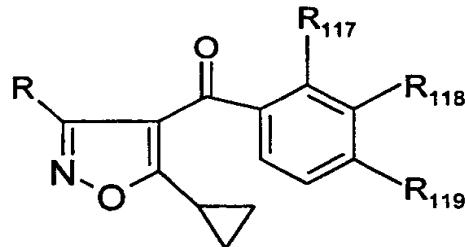
x is zero or one;

10 y is an integer from one to four; when y is greater than one, the groups R⁹ and R¹⁰ may be the same or different;

or an agriculturally acceptable salt or metal complex thereof; which method comprises applying to the locus of the crop, preferably before the herbicidal compound, an antidotally effective amount of an antidote compound, and optional

15 partner herbicide.

2. A method according to claim 1 in which the isoxazole or dione herbicide has the general formula (Ia):



20

(Ia)

are those wherein:

R is hydrogen or -CO₂Et;

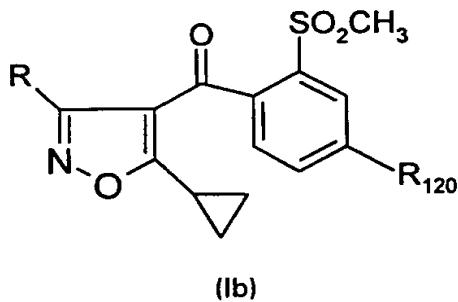
R¹¹⁷ is selected from -S(O)_pMe, Me, Et, a chlorine, bromine or fluorine atom, methoxy, ethoxy and -CH₂S(O)_qMe;

25 R¹¹⁸ is selected from a hydrogen atom, a chlorine, bromine or fluorine atom, methoxy, ethoxy and -S(O)_pMe;

R¹¹⁹ is selected from a hydrogen atom, a chlorine, bromine or fluorine atom, methoxy and CF₃; and

p and q each independently have the values zero, one or two.

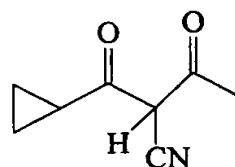
3. A method according to claim 1 or 2 in which the isoxazole or dione herbicide has the general formula (Ib):



5

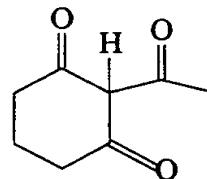
wherein R¹²⁰ is chlorine, bromine or trifluoromethyl; and R is hydrogen or -CO₂Et.

4. A method according to any one of the preceding claims in which a substituted phenyl ring as defined in formulae (I); (Ia); or (Ib) as depicted in claim 1,2 or 3 is attached to a grouping;



5. A method according to claim 4 in which the phenyl ring is substituted by two groups independently selected from halogen, alkyl, S(O)_palkyl (p = 0, 1 or 2) or haloalkyl.

6. A method according to claim 1, 2 or 3 in which a substituted phenyl ring as defined above in formula (I); (Ia); or (Ib) is attached to a grouping;



7. A method according to claim 1 wherein the compound of formula (I) is:

20 5-cyclopropyl-4-[2-chloro-3-ethoxy-4-(ethylsulphonyl)benzoyl]isoxazole;
 4-(4-chloro-2-methylsulphonylbenzoyl)-5-cyclopropylisoxazole;
 5-cyclopropyl-4-(2-methylsulphonyl-4-trifluoromethylbenzoyl)isoxazole;
 4-(4-bromo-2-methylsulphonylbenzoyl)-5-cyclopropylisoxazole;
 5-cyclopropyl-4-[4-fluoro-3-methoxy-2-(methylsulphonyl)benzoyl]isoxazole;

4-(4-bromo-2-methylsulphonylmethylbenzoyl)-5-cyclopropylisoxazole; ethyl 5-cyclopropyl-4-(2-methylsulphonyl-4-trifluoromethylbenzoyl) isoxazole-3-carboxylate; 2-[2-chloro-(4-methylsulphonyl)benzoyl]-1,3-cyclohexanedione; 5 2-[2-nitro-(4-methylsulphonyl)benzoyl]-1,3-cyclohexanedione; 2-(2,3-dihydro-5,8-dimethyl-1,1-dioxospiro[4H-1-benzothiin-4,2' [1,3]dioxolan]-6-ylcarbonyl)cyclohexane-1,3-dione; 5-cyclopropyl-4-(2-methylsulphonyl-4-trifluoromethylbenzoyl)-3-methylthio-isoxazole; and

10 2-cyano-3-cyclopropyl-1-(2-methylsulphonyl-4-trifluoromethylphenyl) propan-1,3-dione.

8. A method according to claim 7 in which the compound is 5-cyclopropyl-4-(2-methylsulphonyl-4-trifluoromethylbenzoyl)isoxazole or 2-[2-nitro-(4-methylsulphonyl)benzoyl]-1,3-cyclohexanedione.

15 9. A method according to claim 1 in which the antidote is selected from: flurazole; fenchlorazole-ethyl; fenchlorazole; benoxacor; dichlormid; fenclorim; furilazole; mefenpyr-diethyl; CMPI; 4-hydroxy-1-methyl-3-(1-1*H*-tetrazol-5-ylmethanoyl)-1*H*-quinolin-2-one; daimuron; (S)-MBU; dimepiperate; 5,5-diphenylisoxazoline-3-carboxylic acid; and ethyl 5,5-diphenylisoxazoline-3-carboxylate.

20 10. A method according to claim 1 in which the antidote is selected from fenchlorazole; CMPI; 4-hydroxy-1-methyl-3-(1-1*H*-tetrazol-5-ylmethanoyl)-1*H*-quinolin-2-one; (S)-MBU and dimepiperate.

11. A method according to any one of the preceding claims in which the crop 25 plant to be protected is maize.

12. A method according to claim 1 in which the application rate of the benzoylisoxazole and/or dione of formula (I) is from 0.004kg to 5kg per hectare.

13. A method according to claim 1 in which the application rate of the benzoylisoxazole and/or dione of formula (I) is from 0.01kg to 2kg per hectare.

30 14. A method according to any one of the preceding claims in which (a) the herbicidal benzoylisoxazole and/or dione derivative and (b) antidote are applied separately such that the antidote contacts the seed or plant being treated before the herbicidal compound.

15. A herbicidal composition comprising:

(a) a herbicidally effective amount of a benzoylisoxazole and/or dione derivative of formula (I) or an agriculturally acceptable salt or metal complex thereof, optionally in combination with a partner herbicide; and

(b) an antidotally effective amount of an antidote compound;

5 in association with a herbicidally acceptable diluent or carrier and/or surface active agent.

16. A composition according to claim 15 which comprises the component (a) as a delayed release formulation.

17. A composition according to claim 15 or 16 in which the weight ratio of the 10 compound of formula (I):antidote is from 1:25 to 60:1.

18. A product comprising:

(a) a herbicidally effective amount of a benzoylisoxazole and/or dione derivative of formula (I), or an agriculturally acceptable salt or metal complex thereof; and

(b) an antidotally effective amount of an antidote;

15 wherein said antidote is antidotally effective to said benzoylisoxazole and/or dione derivative; as a combined preparation for separate, simultaneous or sequential use in the control of weeds at a locus.

19. A product according to claim 18 as a combined preparation for use in which 20 the antidote contacts the seed or plant being treated before the herbicidal compound.

20. A method according to claim 1 substantially as hereinbefore described.

21. A composition according to claim 15 substantially as hereinbefore described.

25 22. A product according to claim 18 substantially as hereinbefore described.